Student Name: _____

Missouri
DEPARTMENT OF ELEMENTARY & SECONDARY
EDUCATION™

End-of-Course Assessment

Algebra II

Algebra 2 Pre-Test

1. What is the expanded form of $3x(x+3)^2$?

   A. $3x^3 + 27x$

   B. $3x^3 + 18x$

   C. $3x^3 + 18x^2 + 18x$

   D. $3x^3 + 18x^2 + 27x$

2. Which equation can be used to find the *n*th term for the sequence below?

   2, 5, 10, 17, ...

t = term n = term number

   A. $t = n + 3$

   B. $t = n^2 + 1$

   C. $t = 2n + 1$

   D. $t = 3n - 1$

3. Solve the system:

$$\frac{x}{3} + \frac{4y}{3} = 100$$

$$3x - 4y = 100$$

   A. $(0, -25)$

   B. (50, 12.5)

   C. (50, 100)

   D. (100, 50)

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4. How does the graph of the function $g(x) = x^3 + 1$ compare to the parent function $f(x) = x^3$

A. shifted up 1 unit

B. shifted down 1 unit

C. shifted left 1 unit

D. shifted right 1 unit

5. Barry is planning to raise some money for his senior dues. He will sell sports drinks, *a*, for $1.65 each and granola bars, *b*, for $0.85 each. Which equation models how much money, *t*, Barry will raise from his sales?

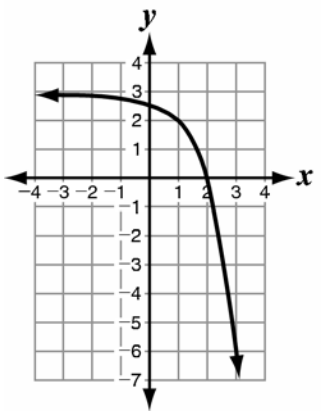
A. $t = \frac{1.65a}{0.85b}$

B. $t = 1.65a + 0.85b$

C. $t = 1.65a - 0.85b$

D. $t = (1.65a)(0.85b)$

6 . Which function is represented by the graph?



A . $y = -3^{x} + 3$

B. $y = -\left(\frac{1}{3}\right)^{x} + 3$

C. $y = -3^{x-1} + 3$

D . $y = -\left(\frac{1}{3}\right)^{x-1} + 3$

7. Yara runs 2 miles the first day. She wants to run a quarter of a mile farther each day. What type of graph would show how much she runs each day?

A. absolute value

B. exponential

C. quadratic

D. linear

8. Consider the function $\boldsymbol{g(x) = a\,(3)^{x}}$, where $\boldsymbol{a > 0}$. What happens to *g(x)* as the value of *a* increases?

A. *g*(*x*) will increase at a faster rate.

B. *g*(*x*) will increase at a slower rate.

C. *g*(*x*) will decrease at a faster rate.

D. *g*(*x*) will decrease at a slower rate.

9. Which expression is the simplified form of $\left(\frac{6x^{-4}y^{3}}{2x^{-1}y^{3}}\right)^{2}$?

A. $\frac{6}{x^{6}}$

B. $\frac{9}{x^{6}}$

C. $\frac{9}{x^{10}}$

D. $3x^{15}$

10. Which function generates the pattern shown in the table?

x	y
0	1
1	2
2	4
3	8
4	16

A. $y = 2^{x}$

B. $y = \log_{2} x$

C. $y = x^{2} + 1$

D. $y = x^{3} + 1$

11. What is the solution to $\sqrt{5x+6}+3=7$?

A. $x = \frac{4}{5}$

B. $x = 2$

C. $x = \frac{34}{5}$

D. $x = 8$

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12. John is buying a car for $8,000. The value of the car will decrease by 5% each year. Which equation can he use to predict the value of the car after 3 years?

A. $y = 8,000(0.05)^3$

B. $y = 8,000(1 - 0.5)^3$

C. $y = 8,000(1 - 0.05)^3$

D. $y = 8,000(1 + 0.05)^3$

13. What are the real zeros of the function $f(x) = x^3 + 6x^2 - 13x - 42$?

A. $-7, -3, -2$

B. $-7, 3, -2$

C. $-7, 3, 2$

D. $7, 3, -2$

14. Jean graphed $y = \frac{3}{4}x - 2$. Then she shifted the *y*-intercept down 3 units and doubled the slope. What is the equation of her new line?

A. $y = \frac{3}{8}x - 4$

B. $y = \frac{3}{8}x - 3$

C. $y = \frac{3}{2}x - 5$

D. $y = \frac{3}{2}x - 10$

15. Carol invests her money in an account that is compounded continuously at a rate of 1.5%. Which expression represents the number of years it will take for her investment to triple?

A. $\frac{\ln 3}{1.5}$

B. $\frac{\ln 3}{0.015}$

C. $\frac{\ln 1.5}{3}$

D. $\frac{\ln 0.015}{3}$

16. Which function has *x*-intercepts of 2 and -5?

A. $f(x) = x^2 + 2x - 5$

B. $f(x) = x^2 - 3x - 10$

C. $f(x) = x^2 + 3x - 10$

D. $f(x) = x^2 + 7x + 10$

17. What is the point of intersection for $f(x) = 2^x$ and $g(x) = \left(\frac{1}{2}\right)^x$?

A. (0, 1)

B. (1, 0)

C. $\left(1, \frac{1}{2}\right)$

D. (2, 4)

18. Which expression shows $x^2 - 6 - x$ factored completely?

A. $(x + 2)(x - 3)$

B. $(x + 2)(x + 3)$

C. $(x - 2)(x - 3)$

D. $(x - 2)(x + 3)$

19. Students in a science class recorded the number of plastic water bottles collected at their school. On the first day, 5 water bottles were collected. Each day after that, the number of water bottles was twice the number collected on the previous day. Which type of function could be written to represent the number of water bottles collected?

A. absolute value

B. exponential

C. quadratic

D. linear

20. **The graph of the function $g(x) = \sqrt{-x}$ is a reflection of the parent function $f(x) = \sqrt{x}$. What is the line of reflection?**

A. the x-axis

B. the y-axis

C. the line $y = x$

D. the line $y = -x$

21. Simplify: $3x(x + y) - 7y(x + y)$

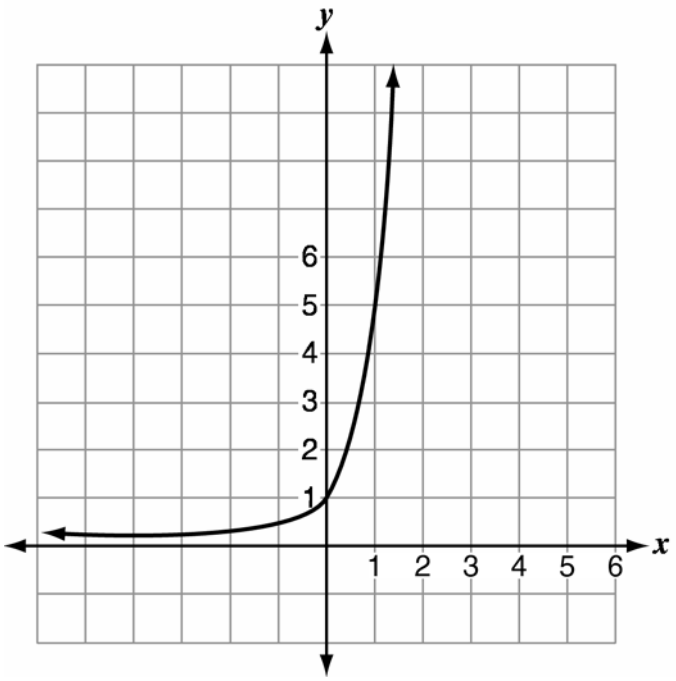
A. $5x - 5y$

B. $-4x^2y^2 + 4xy$

C. $3x^2 + 2y - 7xy$

D. $3x^2 - 4xy - 7y^2$

22. The graph of $y = 5^x$ is shown below.



What is the equation of the asymptote of the graph of $y = 5^x + 3$?

A. $y = 0$

B. $y = 1$

C. $y = 3$

D. $y = 8$

23. Which recursive rule describes the sequence 30, 15, 7.5, 3.75, 1.875, . . .?

t_n	$= n^{\text{th}}$ term
t_1	= first term
t_{n-1}	= previous term

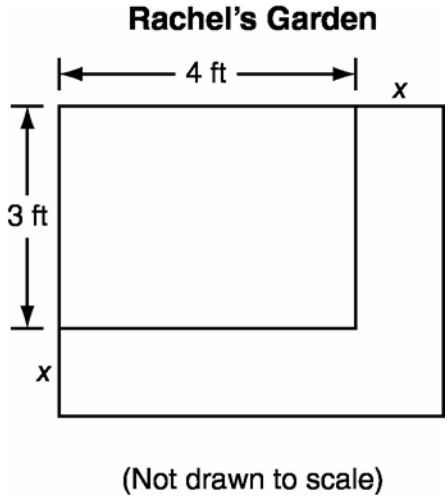
A. $\begin{cases} t_1 = 30 \\ t_n = t_{n-1} - 15 \end{cases}$

B. $\begin{cases} t_1 = 30 \\ t_n = 2t_{n-1} \end{cases}$

C. $\begin{cases} t_1 = 30 \\ t_n = \frac{1}{3}t_{n-1} + 5 \end{cases}$

D. $\begin{cases} t_1 = 30 \\ t_n = \frac{1}{2}t_{n-1} \end{cases}$

24. Rachel wants to increase the area of her garden, as shown below.



(Not drawn to scale)

What value for *x* allows for the new garden area to be 42 square feet?

A. 3.0 ft

B. 3.5 ft

C. 4.0 ft

D. 7.0 ft

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25. **Ellis is studying the graph of a function with the general equation $f(x) = a(x-h)^2+k$. If Ellis only changes the value of a, from 1 to 5, what happens to the graph?**

A. It becomes wider.

B. It becomes narrower.

C. It moves up 4 units.

D. It moves to the right 4 units.

26. Tickets for the school play cost $5 for adults and $3 for students. On opening night, 150 tickets were sold and $560 was collected. How much was collected from the sale of student tickets?

A. $55

B. $95

C. $275

D $285

27. Ms. Juarez showed the graphs of the functions $y = \log_2 x$ and $y = \log_4 x$ to her students. Which conclusion is *incorrect*?

A. The x-intercept of each graph is 0.

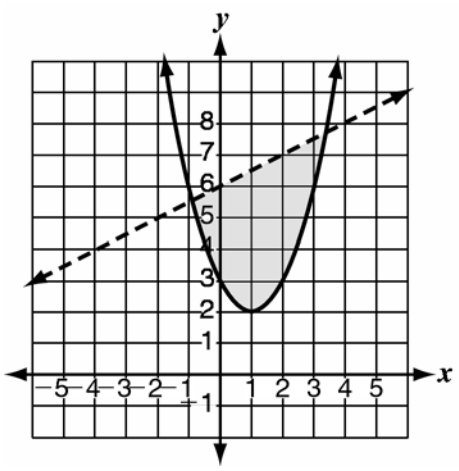
B. The graphs never intersect the y-axis.

C. The domain of each function is $\{x: x > 0\}$.

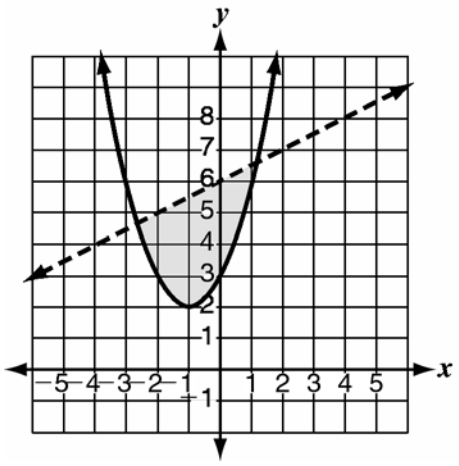
D. The range of each function is {y: all real numbers}.

28. Which graph represents the solution set to the system $y \leq (x-1)^2+2$ and $y < -\frac{1}{2}x+6$?

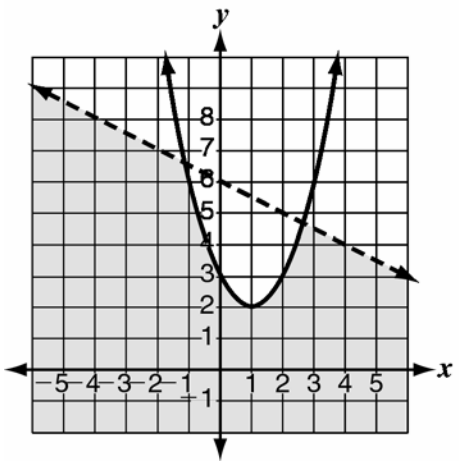
A.



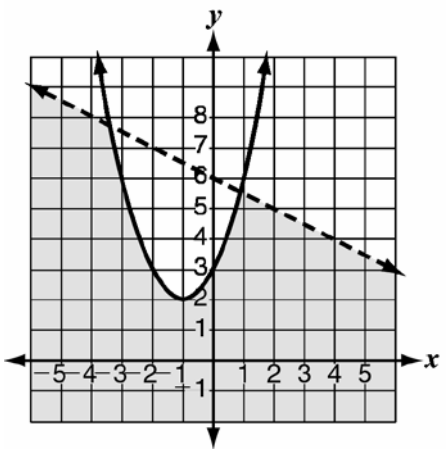
B.



C.



D.



29. Which table(s) represent a function with the same *y*-intercept as $f(x) = 2^x$?

Table 1

x	y
1	4
2	8
3	16
4	32
5	64

Table 2

x	y
1	4
2	16
3	64
4	256
5	1,024

Table 3

x	y
1	1
2	2
3	4
4	8
5	16

A. table 2 only

B. table 3 only

C. tables 1 and 2

D. tables 1 and 3

30. Which expression shows $\frac{x^3-x^2-x+10}{x+2}$ in simplest form?

A. x^2+5

B. x^2-3x+5

C. $x^2+x+1+\frac{12}{x+2}$

D. $x^2-3x+7-\frac{4}{x+2}$

31. Which statement correctly compares the functions below?

Function A: $\{(-3, 4), (-2, 1), (-1, 0), (0, 1), (1, 4), (2, 9)\}$

Function B:

x	-2	-1	0	1	2	3
y	$\frac{5}{9}$	$\frac{5}{3}$	5	15	45	135

A. Both functions are quadratic.

B. Both functions are exponential.

C. Function A is quadratic, and function B is exponential.

D. Function A is exponential, and function B is quadratic.

32. Which term describes the transformation of the function $f(x) = \frac{1}{x}$ that results in the function $g(x) = \frac{1}{x} - 7$?

A. dilation

B. reflection

C. vertical translation

D. horizontal translation

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33. Which equation can be used to find the *n*th term in this pattern, where *n* = term number and *t* = term?

Term Number	1	2	3	4	5	*n*
Term	−2	1	6	13	22	

A. $t = n^2 - 3$

B. $t = n^2 + 3$

C. $t = 2^n - 3$

D. $t = 2^n + 3$

34. What is the solution of the system of equations?

3x- 2y = 11

-x + 6y = 7

A. (5, 2)

B. $(-5, 2)$

C. (2, 5)

D. $(2, -5)$

35. Which value of *x* is the solution to $100^{x+6} = 1000^{2x+3}$?

A. $\frac{3}{10}$

B. $\frac{3}{4}$

C. 3

D. 30

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36. Between $x = 0$ and $x = 1$, which function has a greater average rate of change than $y = 2^x$?

A. $y = 4^x$

B. $y = -2^x$

C. $y = 2^{x-4}$

D. $y = 2^x + 4$

37. Which equation represents the graph of a parabola that opens up and is wider than the graph of $y = x^2$?

A. $y = 2x^2 + 3x - 5$

B. $y = \frac{1}{2}x^2 + 3x - 5$

C. $y = -2x^2 + 3x - 5$

D. $y = -\frac{1}{2}x^2 + 3x - 5$

38. A book club charges $5 to join and $2 per month for membership dues. What type of function represents the total cost based on the number of months?

A. constant

B. cubic

C. linear

D. quadratic

39. Which expression shows the complete factorization of

$$8ax^2+14ax-15a?$$

A. $a(4x+3)(2x-5)$

B. $(8x+3)(x-5)$

C. $a(8x+3)(x-5)$

D. $a(4x-3)(2x+5)$

40. If a ball is tossed up into the air, what model describes the height of the ball over time?

A. linear

B. quadratic

C. exponential decay

D. exponential growth

Item Position	Answer Key	DOK	Standards Key
1	D	DOK 2	Mathematics-HSA|APR|A|1
2	B	DOK 2	Mathematics-HSF|BF|A|1|a
3	D	DOK 2	Mathematics-HSA|REI|C|6
4	A	DOK 2	Mathematics-HSF|BF|B|3
5	B	DOK 2	Mathematics-HSA|CED|A|2
6	C	DOK 2	Mathematics-HSF|IF|C|7|e
7	D	DOK 1	Mathematics-HSF|LE|A|1|b
8	A	DOK 2	Mathematics-HSF|BF|B|3
9	B	DOK 2	Mathematics-HSA|SSE|A|2
10	A	DOK 2	Mathematics-HSF|LE|A|1|c
11	B	DOK 2	Mathematics-HSA|REI|A|2
12	C	DOK 2	Mathematics-HSA|CED|A|1
13	B	DOK	Mathematics-HSA|APR|B|3

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		2	
14	C	DOK 2	Mathematics-HSF|BF|B|3
15	B	DOK 3	Mathematics-HSF|LE|A|4
16	C	DOK 2	Mathematics-HSF|IF|C|8|a
17	A	DOK 2	Mathematics-HSA|REI|D|11
18	A	DOK 2	Mathematics-HSA|SSE|A|2
19	B	DOK 2	Mathematics-HSF|LE|A|1|c
20	B	DOK 2	Mathematics-HSF|BF|B|3
21	D	DOK 2	Mathematics-HSA|APR|A|1
22	C	DOK 2	Mathematics-HSF|IF|B|4
23	D	DOK 2	Mathematics-HSF|LE|A|2
24	A	DOK 2	Mathematics-HSA|REI|B|4|b
25	B	DOK 2	Mathematics-HSF|BF|B|3
26	D	DOK 2	Mathematics-HSA|CED|A|3
27	A	DOK 2	Mathematics-HSF|IF|C|7|e
28	C	DOK 2	Mathematics-HSA|CED|A|3

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29	A	DOK 3	Mathematics-HSF|IF|C|9
30	B	DOK 2	Mathematics-HSA|APR|D|6
31	C	DOK 3	Mathematics-HSF|LE|A|1|c
32	C	DOK 2	Mathematics-HSF|BF|B|3
33	A	DOK 2	Mathematics-HSF|LE|A|2
34	A	DOK 2	Mathematics-HSA|REI|C|6
35	B	DOK 2	Mathematics-HSA|SSE|B|3|c
36	A	DOK 2	Mathematics-HSF|IF|B|6
37	B	DOK 2	Mathematics-HSF|BF|B|3
38	C	DOK 1	Mathematics-HSF|LE|A|1|b
39	D	DOK 2	Mathematics-HSA|SSE|A|2
40	B	DOK 1	Mathematics-HSF|LE|A|